For the Scientific American.

To Millwrights.

I shall not endeavor to entertain you by a repetition of the old portable-mill story, about saving power by using small mill stones instead of large ones, for it is not true, and no man can prove it. Some questions may be asked, however, about certain principles in grist mills, which have been used and handed down from time immemorial, though they have long since been discarded from all other machinery. The common bail and driver, so-called, or its equivalent, which is invariably used to connect the runner stone to the spindle, in reality does not subserve any other purpose, more noticeable, than that it provides a mill with the absolute necessity of wearing out and destroying itself whenever it is in operation. Now, is it common sense so to attach the running stone to the spindle, that whenever it is in operation the dress in the stones will unavoidably be more worn by their contact with each other than by grinding the grain? "What is the advantage of a vibrating mill stone?" is a question which every millwright, who has not been brought up to believe in their necessity, would naturally ask himself, every time he saw such absurdities, and the answer—"no use at all,"—would also be as natural as it is true and undeniable. Or where is the economy in consuming a considerable part of the power of a water-wheel or steam engine in grinding mill stones together, when the only object is to grind grain?

These seemingly impertinent objections to ordinary mills are not ventured on the very common over-estimate of some beautiful mechanical theory, but from an actual knowledge of a better way, the practical value of which has been thoroughly tested for a number of years past in more than a hundred instances.

EDWARD HARRISON.

New Haven, Ct., Sept. 3rd, 1852.

Sensation of Heat.

MESSRS. EDITORS.—It sometimes happens that, in grinding a piece of steel, such as a tool for turning iron, and so holding it as to produce what is technically called a fine "chatter," or vibratory movement of extreme rapidity, producing a musical note of the highest appreciable pitch, there will be communicated to the hand, by such vibration, a sensation not at all distinguishable from ordinary heat; and although I have never known any one burned by such process, yet the sensation is sufficiently painful to cause one to relax the hold for fear of being burned.

I am not able to point out all the circumstances necessary to insure the result, I only know, that in grinding cold steel, it sometimes appears hot, when in contact with the stone, but cold the instant it is removed. Has the fact been noticed by scientific men? Does it not have a bearing on the undulatory theory of heat? J. B. HARTWELL.

Woodstock, Vt., Sept. 6, 1852.

[The same phenomenon has been noticed by others, and a short communication on the subject will be found on page 18, Vol. 7, Scientific American; it is a subject of some interest. Let us ask the question, "What is heat?"—The only answer we can give, is, it is a certain action in certain bodies, which produces a sensation—an action it must be, which we call "heat."

Pigeons.

The late Bishop of Norwich, in his "History of Birds," relates that fifty-six pigeons were brought over from a part of Holland, where they are much attended to, and turned out from London at half-past four in the morning. They all reached their dove-cotes at home by noon; but one favorite pigeon, called Napoleon, arrived about a quarter after ten o'clock—having performed the distance of three hundred miles at the rate of above fifty miles an hour, supposing that he lost not a moment, and proceeded in a straight line. It appears from various trials that the possible flight of a carrier pigeon is about sixty miles an hour.

The Cranberry.

We have received a printed account of the cultivation of the cranberry by Sullivan Bates, of Bellingham, Mass., who cultivates and sells the plants. This fruit is now cultivated on farms, even on dry lands; a few years ago, all that were gathered wild from the swamp. Mr. Sullivan plants in drills twenty inches apart in hills of seven inches. He has raised 400 bushels on one acre.

Chocolate.

Although chocolate is not a daily necessary like tea and coffee, yet the large quantity consumed entitles it to some notice. Chocolate is made from the beans of theobra cacao, a small tree of the malva-family, indigenous to tropical America, and the West Indian Islands, which bears a very small flower, not 2 lines in diameter, and a disproportionally sized gourd-like fruit, which is 4 inches thick and 10 inches long. It contains in a reddish-white agreeably tasted pulp, 25 to 40 kernals or cacao beans, each covered with a skin, with which they are brought into commerce.—When the fruit is ripe, the beans are separated from the flesh and heaped up in pits or ditches covered with boards, where they are left for some days under frequent inspection. A sort of fermentation is thus set up in them which removes a good deal of their bitterness and renders them darker in color; they are subsequently dried in the sun. There are a great many varieties; that from Caraccas is the best, and the West Indian the worst. The beans of cacao have not been thoroughly examined; they are only known to contain a peculiar mild fat, the cacao butter, to the amount of 43 per cent. according to Bousingault, and 53 per cent according to Lampadius. Both experimenters found a considerable quantity of albumen, a kind of tannic acid, and some starch among the more remarkable ingredients. Lampadius' analysis of the cacao of the East Indies does not include the husk, which forms about 15 per cent. of the weight of the beans.

Woskresensky has proved that the beans also contain a peculiar ingredient, similar to caffeine, which he called theobromine. But this substance which is still imperfectly known, differs in composition ($C_{14}H_{16}N_8O_4$,) from the others, containing more nitrogen (35 per cent.,) although in taste it exhibits a remarkable resemblance to caffeine. It cannot be sublimed without decomposition.

In preparing chocolate the cacao beans are roasted in a cylinder similar to those employed for roasting coffee. In this operation the aroma is developed, the bitterness diminished, and the beans are rendered fragile. They are broken under a wooden roller, and winnowed to remove the husk entirely. They may then be reduced to a soft paste in a mahine consisting of an annular trough of granite, in which two speroidal granite millstones are turned by machinery, with knives attached to return the ingredients under the rubbing surface. An equal weight of sugar is here added to the paste, which is finally rendered quite smooth by being ground under horizontal rollers on a plate of iron, heated to about 140° Fah.

The preparation of cacao consists in roasting, peeling, and grating the peeled beans in a warmed rasping apparatus or chocolate machine. The flour of the seeds forms with the liquid fat (melting at 104° Fah.,) a kind of paste which congeals to a solid cake in the moulds.

Population of the United States.

George W. Smith, in a paper recently read before the Franklin Institute in speaking of the density of population already attained in some parts of the United States, referred to a map which he had constructed, which represented a curious illustration of this density. He traced the boundary of an area as large as the kingdom of Great Britain, as follows:—Commencing on the Atlantic, at the mouth of the St. Croix river, ascending it to the head; from this point a line was drawn to the Saco, where it debouches from the White Mountains in New Hampshire, thence to Sandy Hill on the Hudson, in New York; thence to Oswego on Lake Ontario, including all south of it in New York, and all of New Jersey, Pennsylvania, and Maryland, north of the Blue Mountains; along this to the Potomac in Maryland, thence by the latter river to Washington, D. C., thence by a straight line to New Haven, on Long Island Sound, and thence by the sea to the place of beginning in Maine. The included area will be 84,000 square miles, a close approximation to the kingdom aforesaid, and the population of this area at the present moment, including the usual increase since the census, is 8,180,000 in round numbers, an amount equal to that of Great Britain at the accession of George III, and about one-third of that at the present day. The present population of the American area, within the boundaries just mentioned, is twice as great as the average population of eastern or northern Europe, although much less of course, in comparison, than the British, French, German, Austrian, and Italian countries, &c.

A line drawn from Massachusetts Bay to the Potomac, almost in a straight line, passes through more numerous and more populous cities than can be found on a similar line of about 400 miles in extent, drawn on any part of the globe, with the exception of China; London must also be excepted. The population of New York, with its suburbs on Long Island, New Jersey, &c., included in a circle of twelve miles radius round the City Hall, (as the metropolis of London is in a circle of twelve miles round St. Paul's,) is at the present moment, (1852,) 860,000, New York will contain more than one million.

Recent Foreign Inventions.

PAPER.—Jeane A. Farina, of Paris, patentee.

This invention consists in obtaining pulp for the manufacture of paper from the plant called spartum or water-broom.

The patentee takes the plants, and having separated the roots from the stems, he cuts the latter into pieces of from four to six inches long, which pieces he submits to the operation of barking or stripping. He then steeps them in water rendered alkaline with American or other potash, in the proportion of about 2 per cent. of the weight of the stem operated on, and continues the steeping about four hours, during which time the temperature of the solution is raised by steam. As soon as the steeping is completed, and the material is cold, it is removed to a crushing mill, and is then washed in water acidulated with nitric or sulphuric or muriatic acid, after which it is bleached (by liquid chlorine or the vapor evolved from chloride of lime, wetted with muriatic acid) and again washed, when it is in a fit state to be used alone or mixed with cotton or linen pulp, according to the processes ordinarily followed in the manufacture of paper.

The roots of the plant may be treated in a similar way, only as they are much harder than the stems, a greater quantity of potash will be required in the steeping process and of acid in subsequent washing; and the bleaching process will also occupy a longer time. It is to be observed, however, that the pulp produced from the roots will not in any case be so white as that from the stem.

ARTIFICIAL STONE, &c.—Owen Williams, of Stratford, England, patentee.—This improvement consists in certain modes of manufacturing compositions to be used for railway construction and building purposes generally. The following are the proportions of ingredients used in preparing one such composition:—

180 lbs. pitch, 4½ gals. dead oil or creosote, 18 lbs. rosin, 15 lbs. sulphur, 45 lbs. finely-powdered lime, 180 lbs. gypsum, 25 cubic feet sand, breeze, scoria, bricks, stone, or other hard materials broken to pieces, and passed through a half-inch sieve.

The sulphur is first melted with about 30 lbs. of the pitch, after which the rosin is added, and then the remainder of the pitch with the lime and gypsum, which are introduced by degrees and well stirred, and the mixture brought to boil. The sand, or broken earthy or stony material is then added, and the whole mass well stirred, after which the dead oil is in a fit state to be moulded into blocks. In order to consolidate the blocks, pressure is applied to them in the moulds. The patentee gives also the proportions of the above materials to be used as a composition for laying pavements, as a cement for uniting to each other blocks of the first-named composition when used for building purposes, and as a coating for bridges, the roofs of buildings, &c. —[London Mechanics' Magazine.

Great Iron Steamer.

We see it stated in a great number of our daily papers, that the Messrs. Burns, the large stockholders of the Cunard line, have contracted for a huge iron steamer of more than 3,000 tons burden, with engines of more than 1,000 horse-power each, to be built by R. Napier. It is also stated that she is intended for the Cunard Line of Royal Mail Packets; this, however, is a mistake, as the government will accept no iron steamer to fulfil a mail contract, such a vessel may be intended for a passenger line, but not for the mails.

Poison of Fusil Oil—Chloroform.

Some very interesting experiments took place in the laboratory of Dr. Jackson, the eminent chemist, on the 10th inst. They were made in the presence of several scientific gentlemen of Boston. Dr. Jackson placed a rat under a large glass receiver in the wire rat-trap in which it was caught, and a small piece of cloth, about the size of a man's hand, was moistened with chloroform, and placed on the top of the rat-trap, and the receiver placed on a marble slab. The rat, in five minutes afterwards, fell down in a state of insensibility, the only sign of life exhibited was its gasping for breath once or twice.

After the lapse of eight minutes, the rat was removed from the receiver and placed in fresh air; it soon revived, with the exception of its hind legs, which remained in a paralytic state for half an hour, dragging its hind parts along by means of its fore paws; this phenomena was also exhibited some months ago at South Boston, where Dr. Jackson etherized the Puma, or South American Lion, and cut off its claws close to the quick with perfect impunity—cutting off two of the claws of the hind feet of the lion after it had recovered the use of its fore-paws. The Dr. also stated that he had observed the same phenomena at the Grotto del Cani, near Naples, where dogs were subjected to the carbonic acid gas, which is emitted there; the dogs were compelled to drag their hinder extremities by means of their fore-paws, till they had recovered from the effects of the gas.

The rat, after the first experiment, was allowed the use of fresh air for one hour, to recover from the effects of the chloroform; and being found quite lively and animated, at 5 o'clock P. M. the final experiment of subjecting it to the poisonous compound was made. The rat was placed under a receiver, and a cloth wet with an Amyl compound, found by Dr. Jackson in pure fusil oil (of whiskey), was now placed on the top of the rat-trap in the same manner as when the chloroform was used. The rat, after being ten minutes in the receiver, exhibited violent convulsions, like those produced on the human body by all narcotic poisons, Five minutes more elapsed, and the rat fell down in the trap apparently dead; it was taken out and revived partially in the fresh air. It was again placed under the glass receiver, and exhibited now a short quick breathing, and a palpitation of the heart and twitching of the extremities; the breathing was now apparently slower and more difficult, till life became extinct without further struggle.]

In these experiments, a very large glass receiver, capable of holding several gallons of atmospheric air, was used. The Amyl compound, discovered by Dr. Jackson, is not very volatile in its nature, therefore death did not ensue in so short a period of time as would have been the case with a more volatile substance, like chloroform, to convey it to the respiratory organs. The rat is an animal that will exist in sewers filled with mephetic vapors dangerous to human life. A common turtle, which is more tenacious of life than the rat, was placed under the receiver, and was killed in a much shorter period of time.

The slime of snails forms a cement for glass and porcelain; it is a limous composition, of the same nature as the substance of which their shells are composed.

The "Zanesville Courier" has been shown a miniature copper teakettle, made of a half cent piece, by Mr. Hercules Boyd, a young mechanic of that city.

The steamboat Reindeer, on which the explosion took place at Malden, a week ago, took fire and was burned down on the 11th inst., at that place, where it was lying for repair. Unfortunate boat!